

Claims

- [c1] In an ethanol production process wherein a sucrose or starch-containing feedstock is hydrolyzed under fermentation conditions by a fermentation agent to produce ethanol and whole stillage, the improvement to which comprises adding a secondary treatment agent, selected from the group consisting of bacteria, enzymes, fungi, or combinations thereof, during the hydrolyzing of the feedstock, which secondary treatment agent having the following characteristics: active under the fermentation conditions, not denatured in the presence of the ethanol, does not interfere with the production of ethanol by the fermentation agent, and converts at least some of the constituent comprising the whole stillage to a pre-selected by-product.
- [c2] The process according to claim 1 wherein the fermentation conditions are a temperature between about 20°C and 40°C and a pH between about 4.0 and 6.5.
- [c3] The improved process according to claim 2 wherein the secondary treatment agent is the enzyme cyclodextrin glucosyl transferase and the pre-selected by-product is a cyclodextrin.
- [c4] The improved process according to claim 2 wherein the secondary treatment agent is the fungi *Penicillium chrysogenum* and the pre-selected by-product is Penicillin G.

[c5] The improved process according to claim 2 wherein the secondary treatment agent is the bacteria *Lactobacillus cellobiosus*, *Lactobacillus plantarum*, *Acetobacter pasteurians*, *Bacillus pumilus* or *B. licheniformis* and the pre-selected by-product is acetic acid or lactic acid.